



The Science of Motion: Net Force and Acceleration

Read the top half of p. 145.

Why does the average speed change from interval to interval on the motion storyboards?

Net Force Causes Acceleration

Read the bottom of p. 145.

What happens when the net force is in the forward direction?

What happens when the net force is in the backward direction?

What happens when there is no net force?

Acceleration and Your Car

Read and discuss p. 147 and the top of p. 148.

Comparing Net Force: Coaster Car and Propeller Car

<p>Net Force</p> <p>Coaster car rolling down ramp</p> <ul style="list-style-type: none"> • The net force is forward. • The net force causes the coaster car to accelerate in the same direction as the force. Car speeds up. 	<p>Net Force</p> <p>Coaster car rolling across floor</p> <ul style="list-style-type: none"> • The net force is backward. • The net force causes the coaster car to accelerate in the same direction as the force (friction). Car slows down. 	<p>No Net Force</p> <p>Coaster car at rest</p> <ul style="list-style-type: none"> • The net force is zero. • Without a net force, the motion of the coaster car does not change. Car remains at rest.
<p>Net Force</p> <p>Propeller unwinding</p> <ul style="list-style-type: none"> • The propeller car experiences a net force forward. • The net force causes the propeller car to accelerate in the same direction as the force. Car speeds up. 	<p>Net Force</p> <p>Propeller unwound</p> <ul style="list-style-type: none"> • The net force is backward. • The net force causes the propeller car to accelerate in the same direction as the force (friction). Car slows down. 	<p>No Net Force</p> <p>Propeller car at rest</p> <ul style="list-style-type: none"> • The net force is zero. • Without a net force, the motion of the propeller car does not change. Car remains at rest.

What Does This Mean for Your Car?

Read p. 148 and the top of p. 149.

Using either words or force diagrams, show TWO ways to increase the forward net force of your propeller car.



Reflect

1. What are some *design changes* that you can make to your propeller car to increase the forward net force acting on the car as the propeller engine unwinds? What effect will this change have on acceleration?
2. What are some *design changes* that you can make to your propeller car that will decrease the backward net force acting on the propeller car as it coasts? What effect will this change have on acceleration?
3. Find two examples in your home or neighborhood of net force causing acceleration. Draw a sketch and write a description for each one.
4. Complete the Bicycle Motion Storyboard sheet. This motion storyboard is different because the bike changes its motion several times in ways that are different from your coaster car or propeller car. However, you should analyze the motion in the same way you did for the other motion storyboards. Use the first two rows for examples.

Revise Your Recommendations

Read this section on p. 151. Follow your teacher's directions to revise your previous recommendations on a new "Create Your Explanation" sheet.

Communicate

Follow your teacher's directions to share your revised recommendations.

More to Learn

Read the “Newton’s Law’s of Motion” box on p. 152. Give an example of something you’ve seen in class for each of the following laws:

Newton’s 1st Law: An object at rest will remain at rest and an object in motion will remain in motion at a constant speed in the same direction unless an unbalanced force acts on it.

Newton’s 2nd Law: If a net force acts on an object, the acceleration of the object depends on the magnitude of the net force and the mass of the object.

Newton’s 3rd Law: For every force exerted on an object, an equal and opposite force is exerted by the object.

What’s the Point?

Read the bottom of p. 151. List four main ideas from this section.

1.

2.

3.

4.